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THE PLANT DISEASE REPORTER

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Division of Mycology and Disease Survey

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BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

THE PLANT DISEASE REPORTER

Issued by

THE PLANT DISEASE SURVEY

DIVISION OF MYCOLOGY AND DISEASE SURVEY

Vol. XXII Number 21

November 15, 1938

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TO ALL READERS OF THE REPORTER

With the close of the crop year for most of the country, the Survey requests reports and summaries of plant disease conditions observed during the season.

Chief Collaborators in each of the States will presently receive a duplicate set of revised crop loss estimate sheets and also a supply of annual report cards for summarizing and recording 1938 observations. All friends of the Survey, as well as all collaborators, are invited and urged to send in records of their observations. Report cards with maps of the respective States on the back may be had from the Chief Collaborator in each State or from the Division of Mycology and Disease Survey in Washington, in any quantity desired.

No two seasons are identical and 1938 has been characterized by a number of unusual variations from the average as, for example; the western spread of stem rust of grains, the severity of leaf rust, the prevalence of downy mildew on various crops including potato late blight, and many others. Records of these conditions made now while they are still clearly in mind will be of much use in later years. Report cards are available to all. Brief articles or paragraph notes are also solicited.

The general use of crosshatching or other markings on the report card maps is suggested as a convenient means of recording distribution. The face of the card is designed to facilitate reporting with economy of time and effort. Universal response to this request is hoped for. Please do your part.

THE PLANT DISEASE SURVEY

LATE BLIGHT AND OTHER POTATO DISEASES IN 1938: REPORTS FROM VARIOUS STATES

The gratifying response to a request for information on potato diseases, with special reference to late blight, is presented below. It should be mentioned that this is not the total response, since reports have been promised from some additional States, and more complete information from some of those included here, as soon as the data is available. The Survey wishes to thank these contributors.

POTATO DISEASES IN NEW HAMPSHIRE: The spring of 1938 was favorable for the growth of the potato, the stand and growth of the earlier plantings being especially promising. However, following the wet weather in July (there were 18 rainy days during the month and the total fall was over 11 inches) early blight [*Alternaria solani*] began to appear throughout

New Hampshire and by mid-August had already done much damage. Before the end of August in the northernmost section of the State, early blight was prevalent and in fields here and there the plants were already moribund; late blight [Phytophthora infestans] infection was sporadic, but more than usually destructive wherever present.

In the mid and southern sections of the State, late blight did not appear until after the heavy rains in September (there were 14 days of rain during the month and seven-eighths of the total fall of 8 inches fell between the twelfth and the twenty-second) and generally its presence remained unsuspected until harvest. There has been considerable loss in the aggregate from tuber rot, the amount found in the fields depending much on their situation and the vigor and verdancy of the potatoes at the time of infection. Tuber infection was most severe in heavy soils and the low poorly drained areas of fields.

Altogether, a poor year for potatoes, despite the promising start, and the worst late blight year in two decades. (O. Butler. New Hampshire Agricultural Experiment Station).

LATE BLIGHT AND OTHER DISEASES IN VERMONT: Unfortunately, we have only hearsay evidence and scattering individual reports concerning late blight in the table stock potato fields. In the case of such fields as were entered for certification comparatively little blight was encountered. Probably the majority of fields showed some trace, at least, of late blight on second inspection but in few cases had the disease developed to a point where any considerable amount of rot would naturally be expected. Inspection, however, was finished about the first of September and there was opportunity for some blight after that. I visited the Greensboro section a few days ago and looked over some of the seed potato lots which are stored in the two big warehouses there and saw very few tubers that had any blight about them. None of the growers with whom I talked seemed to have had much, if any, late blight trouble.

From conversation with many farmers about the State, I believe that a very large part of the small lots of potatoes grown for home use, with perhaps the thought of selling a few bushels, are badly rotted as a result of late blight. Several times I have been told by growers that they were already selling potatoes to the farmers whose own lots had gone wrong. One big table stock grower at Braintree, informed me a few days ago that he dug and put into his winter storage about 3,600 bushels of potatoes. He had not noticed much late blight in his fields and did not know that any tubers were infected when he put them in. Now he says he thinks he will lose 50 percent of them on account of late blight rot. He had sprayed five times, but I think he missed it on the last end of the season. I saw a lot grown on the State School Farm at Vergennes a while ago in which I believe that more than half of the tubers were rotting from late blight. I am convinced that there will be a very heavy shrinkage in potatoes throughout the State.

If, as it appears must be the case, twelve to thirteen thousand acres of the State's total potato crop are grown in these small home use fields, where little care is given them, it would not be surprising if half, at least, of the crop was lost from blight, though as already pointed out, we have no statistics on this.

With regard to other potato diseases, there was nothing particularly unusual observed in our seed certification work or in such casual inspections as we made in other fields. Leaf roll was the cause of some rejections in enrolled fields and undoubtedly discouraged some growers from even entering for certification. It did not occur in abnormally high percentages, however, and the same was true of mosaic. Early blight combined with late blight and tip burn in ripening off many fields earlier than usual. This was probably due in a measure to the tender condition in which the plants were found after the hot and moist season through July and early August. No yellow dwarf and very little black leg [Bacillus phytophthorus] were encountered during the season. (Harold L. Bailey, Oct. 31. Vermont State Department of Agriculture).

LATE BLIGHT AND OTHER DISEASES IN MASSACHUSETTS: Only in the southeastern section of the State was there appreciable loss from late blight prior to the onset of the fall wet weather in September. In the heavy producing section of Bristol County, all unsprayed or poorly sprayed fields of all varieties were heavily damaged by blight on the tops during late June and throughout July. Late varieties that escaped the disease then were not damaged materially during the warmer month of August. The same also was true for late varieties generally over the State, about the normal amount of infection occurring during August and early September: light to moderate injury on poorly protected crops; little or none in well-sprayed fields.

The five-day cool, rainy period of September 17 to 21, however, changed the picture tremendously. In many fields, new vine growth that put out after spraying was terminated, was infected at the beginning of that wet period. The rainfall was heavy enough (about 12 inches) to wash the late blight spores down to the tubers. The result was that many crops over all the State underwent heavy tuber decay. In the Connecticut Valley, additional loss of the crop before digging occurred from flood waters of the Connecticut River, many fields being destroyed entirely regardless of presence or absence of late blight. In spite of the late season weather that favored late blight, many growers who are accustomed to doing a good job of spraying and keeping the vines covered as long as they are growing, found little or no late blight tuber rot at digging time. Needless to say, the greatest losses from late blight were in gardens and small fields, whereas most of the larger, well equipped growers experienced proportionately lighter losses. A few growers had killed their nearly mature vines with an arsenical weed killer prior to the September wet spell and thereby escaped late blight rot.

Leaf roll was another outstanding disease this year, particularly in the Chippewa variety. Other virus diseases, scab [Actinomyces scabies] and rhizoctonia [R. solani] were about normal. Black leg and early blight might well be considered worse than usual this year, particularly in Bristol County. (O. C. Boyd, Oct. 28. Massachusetts State College).

LATE BLIGHT AND ROT OF POTATOES IN NEW YORK STATE: Late blight, although occurring in parts of New York State nearly every year, developed into an epidemic during 1938. The disease appeared first, as usual, on Long Island in early June, and spread there to parts of the Island not usually affected. There was some reduction in yield from early death of the vines and rot developed in many fields, but the average loss is estimated to be not greater than 10 percent.

In upstate New York, the blight began to be noticed in the Southern Tier of counties about the middle of July and by August 15 it could be found in practically every county in the State. The very hot dry weather during the first half of August halted its development so that it seemed likely no serious loss from rot would result. The cooler temperature and rainy weather of late August and of September permitted the blight fungus to gain a renewed impetus, while the very heavy rains of September 20 to 22 soaked the soil in most regions, affording conditions exceptionally favorable for infection of the tubers. The weather throughout the harvest period was unusually warm and fair so that the tubers went into storage in a dry condition. At this time rot was found to be general, especially a soft rot resulting from an invasion of the blight lesions by secondary rot-producing organisms. The continued warm weather while the potatoes were in storage has been favorable for development of soft rot and complaints from farmers about the extent of this rot in their cellars have been numerous.

Early potatoes, as a rule, did not suffer to any extent from either blight or rot. Mid-season and late varieties that were killed early by blight have suffered a considerable loss in yield but have rotted very little. Fields that continued to live, although blighted to some extent, have developed the highest percentage of rot, which indicates that poor spraying or dusting, under conditions that developed this year, often resulted in greater loss than when no applications of copper were made at all.

An examination of 28 fields of central and western New York being dug at the time of the inspection, October 13, and 17 to 19, indicated plainly that spraying with Bordeaux mixture had prevented blight rot to a large extent. With the exception of one field that had been submerged and that had 50 percent rot, nine other well-sprayed or well-dusted fields averaged less than 2 percent rot; fourteen fields that were unprotected had an average of 22.8 percent rot; while four others partially protected averaged 8 percent rot.

A report of the blight and rot situation has been obtained from county agents of 35 counties and 25 of these have given an estimate of the average total loss for their counties. These range from 10 percent on Long Island to as high as 70 percent in one upstate county. The lowest average loss from an upstate county is reported as 25 percent. The average for all counties is 38 percent. These estimates may be high but, if we take into consideration the rot that has been and still is developing in storage, the loss may be even greater.

Mr. Daniel Dean, a prominent potato grower of Nichols, Tioga County, one of the Southern Tier, says that at least half of the potato fields are not worth digging. Those few that were sprayed, except for three or four that were well-sprayed, are as bad as or worse than the unsprayed.

From the reports of the county agents, it is learned that in most counties 75 percent or more of the farmers did not protect their vines from blight with either spray or dust. The period of several years when blight was a factor of little or no importance had made them indifferent to the value of protection. (M. F. Barrus. New York State College of Agriculture).

LATE BLIGHT AND LEAF ROLL IN NEW JERSEY: Late blight was more prevalent in New Jersey than has been the case for the past twenty years. The disease was first observed in the vicinity of Cranbury, on June 17 and was soon reported from all parts of the State. No satisfactory estimate can be made of the effect of the disease on yield. In one field, for example, where late blight was present on nearly every plant in the late season, the yield of plots sprayed with Bordeaux mixture was 523 bushels to the acre as compared with 494 bushels for adjoining plots dusted with a pyrethrum-Rotenone-sulfur dust. These latter plots appeared to be but little better than those receiving no treatment. The fact that the yield in this and other fields was not reduced to a greater extent may be accounted for on the grounds that infection did not become general until after the tubers were well developed. In those fields where the disease appeared early, the losses were much greater. In one case, where yield records were obtained, it is estimated that the crop was reduced at least 25 percent.

Late blight rot was found in some fields and was reported in carlot shipments by inspectors at the receiving point, but the losses cannot be said to be particularly large. Most of the New Jersey crop was moved directly to the market and was consumed before late blight developed. Had these potatoes been stored, the losses would have been serious. This is apparent from the fact that sample lots of potatoes from unsprayed plots held in common storage for four weeks, showed approximately 25 percent shrinkage, largely due to late blight rot, as compared with less than 1 percent loss from sprayed plots in the same field.

More leaf roll was observed in New Jersey this year than has been the case for a number of years. Fields were observed in which as many as 75

percent of the plants were affected. This disease was found in Irish Cobblers but it was particularly prevalent in the Chippewa variety, in seed purchased from one of the northern seed-growing states.

Despite the fact that these and some other diseases were more prevalent than for a number of years it must be pointed out that the average yield for the State was higher than usual. While some growers experienced low yields, yields of 400 to 500 bushels were not uncommon. Yields of Chippewas of 350 to 400 bushels to the acre were reported despite the fact that leaf roll counts as high as 35 percent were recorded in these fields. The large average yield obtained despite the unusual amount of disease present may be explained on the basis of extremely favorable moisture conditions during most of the season. It is impossible to predict what the yield would have been in the absence of diseases. (Wm. H. Martin. New Jersey Agricultural Experiment Station).

LATE BLIGHT IN DELAWARE: We have had somewhat of an outbreak of late blight on potatoes but I have not had time to go over the fields to learn how severe it is. I have seen the harvest of several plantings of Late Reds. This variety is extensively grown in this State for a late crop. A small percentage of these are showing rot at time of harvest.

The season has been very wet here during August and we have had some flooding out in certain sections. (T. F. Manns, Nov. 11. Delaware Agricultural Experiment Station).

POTATO DISEASES IN MARYLAND FOR THE 1938 SEASON: The losses from potato diseases in Maryland in 1938 were the largest they have been for many years. It is estimated that these losses will amount to approximately 37.5 percent of the crop, distributed as follows: late blight (Phytophthora infestans) 25 percent, scab (Actinomyces scabies) 2 percent, leaf roll (virus) 2.5 percent, wilt (Fusarium spp. and Bacterium solanacearum) 2 percent, mosaic (virus) 1 percent, early blight (Alternaria solani) 0.5 percent, blackleg (Bacillus phytophthorus) 0.5 percent, tip burn and hopperburn (non-parasitic and leaf hoppers) 0.5 percent, and other diseases, such as spindle tuber, curly dwarf, yellow dwarf, etc. 0.5 percent.

This year late blight was found in potato fields located in every part of the State. It is usually confined to the western part, where the elevation ranges from 1,000 to 3,000 feet above sea level. There it caused a loss of about 50 percent of the crop this year, owing to its early appearance and the difficulty of control. Vines of all growers who did not spray or dust thoroughly enough were killed prematurely, with resultant low yields and poor quality. Fortunately, there was not much rain when the late potato crop was dug in the western part of the State, and losses from tuber rot were not very large.

Late blight was observed on the early Irish Cobbler potato crop on the Eastern Shore by the writer for the first time since he came to Maryland in 1921. The disease appeared late in the season and did not cause much injury to the vines or reduction in yield. It was, however, responsible for severe losses from tuber rot. It prevented many growers from meeting grade requirements and caused much loss from tuber rot in transit. This condition was partially responsible for the unusually low prices received for the early potato crop. Potato dealers could not afford to pay much for the crop because of the risk of severe losses from tuber rot. It is estimated that the loss to the Eastern Shore potato growers from late blight amounted to at least 15 percent of the value of the crop.

The late seed and table stock potato crop has also been attacked by late blight, and reduced yields were obtained by all growers who did not thoroughly spray or dust their vines. This crop has just been dug, and reports of late blight rot have come in from several fields. It is estimated that the combined loss from late blight in the vines and tubers in the late seed and table stock potato crop will amount to approximately 25 percent of the value of the crop.

Losses from fusarium wilt, which are usually very large in the western part of the State, were much less than usual. These diseases are usually much more prevalent during hot, dry seasons than they are during cool, wet seasons, such as we had last year. On the other hand, losses from southern bacterial wilt were larger than usual. Losses from this disease were largest in the late Eastern Shore seed and table stock crop, where the rainfall was unusually large during the growing season. The losses from these diseases are estimated at approximately 1 percent of the crop for each disease. Losses from leaf roll were somewhat larger than usual, owing to planting much diseased northern-grown seed stock. Out of 285.5 acres of late-grown seed potatoes inspected for certification, 56.5 acres, or approximately 20 percent, were disqualified on account of leaf roll. Losses from leaf roll were estimated at 2 percent of the value of the crop from decreased yields and 0.5 percent of the value of the crop from failure of seed stock to certify. Losses from other diseases were approximately the same as they have been during the past few years.

The University of Maryland is cooperating with the United States Department of Agriculture and other States in an effort to control potato diseases by the use of disease-resistant varieties. The susceptibility of many potato seedlings to late blight, wilt, scab, and virus diseases is being studied. The greatest progress has been made in resistance to late blight. In experiments conducted in 1938 at Oakland, Maryland, where the elevation is between 2,500 and 3,000 feet above sea level, five blight resistant seedlings yielded more than any of the rural varieties. The rural varieties are the highest yielding commercial varieties which are grown in Maryland at elevations above 1,000 feet above sea level. In the 1938 experimental plots at Oakland, ten rural strains yielded from 220 to 291 bushels per acre, and

five blight resistant seedlings yielded from 325 to 443 bushels per acre. None of the rural varieties or strains were resistant to late blight. The entire field was thoroughly sprayed ten times with Bordeaux mixture. Resistance to late blight was studied in another unsprayed field. (R. A. Jehle. University of Maryland).

THE POTATO DISEASE SITUATION IN EASTERN VIRGINIA IN 1938: The 1938 season was featured by destructive outbreaks of late blight in the spring and fall crops and by an abnormal amount of leafroll in some fields in the spring. The usual amounts of Rhizoctonia, scab, blackleg, early blight, and brown rot also occurred.

Late blight was first reported on June 6 from Princess Anne and Accomac Counties. It spread rapidly and by the middle of June it had caused serious damage to at least 50 percent of the potato acreage and was present in practically all potato fields. On June 14 it was also found to a limited extent in several tomato fields adjacent to badly blighted potato fields. The blight fungus could still be found fruiting on potato leaves when the last potatoes were dug about the middle of July.

A considerable amount of late blight rot was occurring in the tubers by June 14. By that time a number of shipments had been turned down at the market end and affected potatoes were also being received at the grading platforms. The growers were advised to delay digging until the vines were completely dead and the rot had progressed far enough to be easily recognized and sorted out in the fields. This improved conditions for a few days but heavy rains set in during the last week in June and many potato fields were so badly flooded that the potatoes could not be dug until the second week in July. By this time many fields were a complete loss because of late blight rot and flooding.

The weather in April, May, and June was abnormally wet and cold and therefore especially favorable for late blight. Rainfall was 54 percent above normal in April and May and was distributed over periods of several days. In June the rainfall was 7.25 inches (nearly twice normal) and occurred on 16 days. The temperature was from 1 to 14 degrees below normal on 15 days in May and from 1 to 11 degrees below normal on eleven days in June.

Late blight was found in a planting of fall potatoes in Princess Anne County on October 5 and since then has been found in numerous fields throughout the Norfolk and Eastern Shore trucking area. The tops have been killed so early in some of these fields that the yield will be considerably reduced. Since a large proportion of the fall crop is saved for seed to be used in the spring, there will be an ample supply of infected seed to start an epiphytotic if weather conditions are favorable then.

Late blight has occurred regularly in the fall crop for the last three years, but this is the first time that it has caused serious damage to the spring crop. The very fact that late blight occurs so seldom in this area makes the disease especially destructive when it does develop, because most of the growers are not prepared to spray and are not justified in spraying regularly as a preventative measure. A blight resistant variety would therefore be especially desirable for this area.

Leaf roll was especially prevalent in many of the fields in which Maine seed had been used. A survey showed that infection ranged from a trace to 75 percent of the plants in the different fields. (Virginia Truck Experiment Station, Norfolk, Harold T. Cook).

LATE BLIGHT AND BACTERIAL SOFT ROT IN WESTERN VIRGINIA: Late blight was very prevalent in western Virginia just before the crop matured. There was more bacterial soft rot in the potatoes this season than I have ever known before. People, here in Blacksburg, complained of soft rot in their potatoes at digging time, and we had numerous inquiries from other sections of the State. (S. A. Wingard. Virginia Agricultural Experiment Station).

LATE BLIGHT AND OTHER DISEASES IN WEST VIRGINIA: Dr. Westover, in charge of potato work for the Department of Horticulture, informs me that on account of the cold, wet spring there was an unusual amount of potato black leg. As usual, the amount of the disease varied widely from field to field, often as high as from 10 to 15 percent occurring in certain fields while other fields would be almost or entirely free. Late blight was also very prevalent and did much damage. It was characterized by being unusually early. Dr. Westover observed it first on the first day of July when the fields were already very heavily infected. Late plantings suffered somewhat less than early plantings for the latter part of the season was relatively dry. As a result of dry weather at harvest time, the amount of loss in storage will probably be less than would be expected from such heavy field infection.

The dry weather that prevailed during late summer was favorable for the development of leaf hoppers and the drier sections of the State, where late blight was less injurious, had serious injury from hopper burn.

No unusual amount of Rhizoctonia infection was observed. This disease apparently is not so destructive here as in some other sections of the country.

Blue stem was also very prevalent in the region of Morgantown and vicinity but no accurate estimates of its prevalence can be made because the plants were so badly affected with late blight that the symptoms were obscured.

It would be difficult for us to make a very accurate estimate of the losses from each of these diseases but I will give you the following estimates for what they may be worth: Black leg, 3 percent; late blight, 10 percent; Rhizoctonia, trace; hopper burn, 5 percent; blue stem, 5 percent. (J. G. Leach. West Virginia University, College of Agriculture, Forestry, and Home Economics).

LATE BLIGHT IN OHIO: Mr. E. B. Tussing, Extension Specialist in Horticulture, who is working on potatoes, and I have prepared the following report on late blight of potatoes in Ohio for 1938.

The first obvious appearance of late blight occurred August 12 in northeastern Ohio. At that time we had an abundance of rain, and hot weather, followed by much cooler weather. The late blight appeared to spread for a short period--four or five days. Then the weather conditions changed and it became dry and hot. No further spread of the disease on the vines was noticeable, but considerable late blight rot was observed on tubers when dug.

In a survey made by Mr. Tussing, from none to 12 percent of tubers showed infection by late blight. It is probable that after the hot, dry period in August, and the first part of September, the fungus was able to spread slowly, and the resulting spores were washed down into the numerous soil cracks by the rains around September 14.

Late blight was general this summer in northeastern Ohio and as far west as Hardin County. Late blight was found in Washington County on Cobblers around the Ohio River, doing considerable damage, which is very unusual for that section of the State. It also did considerable damage on muck soil in Hardin County.

The striking thing is that late blight tuber rot was more prevalent than usual this year. (C. C. Allison, Ohio State University College of Agriculture).

POTATO DISEASE SITUATION IN MICHIGAN: Late blight of potato appeared in Michigan following abundant rainfall at close intervals through July and early August. Most severe damage was found as expected in unsprayed fields. Losses ranging from a trace to 10 percent of the crop have been reported from fourteen counties although it is probable that localized infection was present in several counties from which no reports were obtained. Average losses for the State however are small. In the Upper Peninsula late blight has been reported from Alger, Dickinson, Delta, Iron, Mackinac, Marquette, Luce, Schoolcraft and in the Lower Peninsula from Montcalm, Saginaw, Lapeer, Tuscola, Mecosta, and Otsego counties.

In Montcalm County the principal damage was done to foliage with practically no tuber rot. In certain Upper Peninsula counties both vines

and tubers were affected ranging from a trace to 10 percent for the former and a trace to 15 percent for the latter.

Early blight due to excessive and almost daily precipitation during July was abundant and on the whole was more serious than late blight. For the State an estimate of 5 percent loss seems conservative.

Unusually warm weather during potato harvest and two or three weeks after, has resulted in considerable "scalding" of tubers in storage. When coupled with deep scab and mechanical injuries, bacterial soft rot has developed with consequent losses of the crop. Resorting of stored potatoes has been resorted to in an effort to reduce losses from these causes.

Virus diseases were no more prevalent than last year and yellow dwarf showed a decrease. (J. H. Muncie, Michigan State College).

LATE BLIGHT IN WISCONSIN: Potato late blight appeared in Wisconsin in destructive amounts in August and September. The first appearance was noted in Oneida County August 12 and in Dane and Washington Counties August 28 to 29. Foliage blight was general on late varieties and where the soil was of a clay loam or muck type. Irish Cobbler and other early varieties planted early in the season generally escaped infection. Late planted early varieties suffered extensively.

Tuber rot was extensive on late varieties in the Milwaukee trucking area and in the north central sections. It was of less importance in the northwestern and northeastern parts of the State where a period of local dry weather checked the fungus after it had started.

Estimated loss due to late blight and wet weather at digging is about 10 percent. There has been a tendency for good stock to remain in cellar storage and for the questionable stock to be put on the market. (R. E. Vaughan. University of Wisconsin, College of Agriculture).

POTATO DISEASES IN MINNESOTA[1/] Late blight occurred in the east central part of the State, probably during the rainy weather of the first week in September. Its occurrence in the field was probably not recognized by most growers, and the extent of the damage will be known only as reports of tuber decay come in. Several such reports have come from scattered points in the east central section of the State. One lot examined by the writer was badly decayed. These had been sorted several times and only 6,000 bushels remained from a crop of 20,000 bushels.

Yellow dwarf is present to some extent in the region north of the Twin Cities. (Carl J. Eide. University of Minnesota).

1/See also page 439.

PLANT PATHOLOGY IN FICTION

It may not be out of place to call attention here to the vivid historical novel "Famine" by the Irish writer Liam O'Flaherty. Fiction is entirely out of the Reporter's field, but this novel, based on the well-known appalling effects of the late blight outbreak in Ireland in the middle nineteenth century, might well be considered unusually interesting reading for plant pathologists, if only to give them a renewed appreciation of the importance of the work they have done and are doing to prevent such catastrophes. Of course it is only under very unusual circumstances that a plant disease would become a major factor in history, as did late blight in this instance, when it became the decisive last straw in the fate of an impoverished but self-respecting population.

One may say that this story is of historical interest only to present day pathologists, since the advance in knowledge would make it impossible for such an occurrence ever to happen again with any plant disease. Perhaps so; but, are we so sure? Many plant diseases are still major problems in a farmer's routine, and, on occasion, are still known to cause widespread destruction that might almost equal that of the Irish late blight epiphytotic if the population were as completely dependent on the crop involved as the Irish were on potatoes.

During the decade preceding the past three or four years one might have thought plant diseases of negligible importance in comparison with drought, heat, and insects. Then, in 1935, came a major stem rust epiphytotic, repeated with less severity in 1937 and in 1938, over somewhat varying territory in each of the three years, and marked by the predominance of a physiologic race of rust to which a hitherto resistant variety of wheat, developed to replace older very susceptible varieties, was itself extremely susceptible.

Late blight of potatoes has been almost non-existent in middle western areas and of negligible or little importance in the North Atlantic region for a number of years. Its importance this year is indicated in the reports given above.

A few years ago collaborators in many States contributed reports on agricultural projects known to have failed through plant disease (PDR 18: 7-16, Mar. 15; 23, Apr. 1; 40, May 1, 1934). Conspicuous among the causes of these failures were the root rot due to Phymatotrichum omnivorum and the virus disease curly top, while in more limited areas fusarium wilts and various other virus diseases especially, as well as fire blight, and others, prevented or made unprofitable the growing of susceptible crops in regions otherwise favorable. It cannot be said that these diseases are not problems now.

Unless the time comes, as H. G. Wells in "The Shape of Things to Come" predicts it will, when all disease, human, animal, and plant, is eradicated from the earth, it would seem that there will always be conditions under which plant diseases will become of major importance in spite of all that is known about control, whether by spraying, resistant varieties, seed treatment, or other means, and that there will always be a need for the work of plant pathologists--work which is none the less valuable because it is much more likely to be an unexciting day-to-day search for knowledge than it is to be connected with an event of such dramatic interest as the subject of "Famine".

THE REACTIONS OF INTRODUCED BEAN VARIETIES TO RUST (UROMYCES PHASEOLI TYPICA) IN HAWAII [1]

G. K. Parris

Bean rust was first reported from the Hawaiian Islands by Carpenter[2] in 1918. The disease apparently has never assumed serious proportions until recently. Careful surveys of bean diseases by the author during the period August 1935 to November 1937 failed to reveal a single instance of this fungus in the Territory. In December 1937 specimens were received from Pearl City, Oahu, of bean leaves on which rust in advanced stages caused pronounced yellowing, with abundant sporulation. The variety attacked was Lualualei, the most widely grown bean in the Hawaiian Islands. This high-yielding variety is a green-podded field bean with brown, kidney-shaped seeds, believed to have been developed at Lualualei, Oahu, at least 20 years ago. In two months the rust spread to all bean-growing localities on Oahu and was also causing severe losses on the outside islands of Molokai, Maui, and Kauai, and, to a less extent, on the island of Hawaii. Spraying with sulphur was recommended to growers, and the progress of the disease was somewhat checked when adequate spray programs were carried out. Copper sprays were without benefit. These results are in accord with data reported by Townsend[3].

Seeds of 41 horticultural bean varieties, both named and unnamed, said to be resistant to rust on the mainland United States, were obtained[4] during February 1938 from the following mainland seed companies and research

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[1] Approved for publication by the Acting Director, Hawaii Agricultural Experiment Station.

[2] Carpenter, C. W. Uromyces appendiculatus on Phaseolus sp. in Hawaii. In: Ann. Rept. Hawaii Agr. Exp. Sta. 1918, p. 43. 1919.

[3] Townsend, G. R. Bean rust in southern Florida. Plant Disease Reporter 21: 96. 1937.

[4] In cooperation with J. E. Welch of the Horticultural Division.

investigators:

1. Dr. S. A. Wingard of Virginia
2. United States Department of Agriculture
3. The Ferry-Morse Seed Company
4. The Associated Seed Growers Association
5. Aggeler and Musser Seed Company
6. The New Hampshire Agricultural Experiment Station.

The varieties were tested as to their resistance or susceptibility to the Hawaiian strain of rust by artificial inoculation, under greenhouse conditions, with a spore suspension of the fungus. The only spore form known in Hawaii is the uredospore. Spores were obtained from the variety Lualualei from three different localities on Oahu (Honolulu, Waipahu, and Lualualei), two localities on Kauai (Kokee and Koloa), and one locality on Maui, and inoculated separately on the introduced varieties. Identical reactions were obtained when spores from the different localities were used; in other words, a single form of rust appears to be present throughout the Territory. Results are presented in Table 1; the method of Townsend5/ has been used to designate the degrees of susceptibility or resistance to U. phaseoli typica.

It is interesting to compare the reactions of certain varieties to the Hawaiian form of rust under Hawaiian conditions with data obtained by mainland investigators on the same varieties and the particular forms of rust present in various localities. Boyd6/ reports that ordinary Kentucky Wonder is very susceptible in Massachusetts, while Kentucky Wonder Brown-Seeded Rust Resistant from the Associated Seed Growers is practically immune. These results are in accord with findings in Hawaii for those varieties. On the other hand, Boyd finds that the Virginia hybrids from Wingard and the varieties U. S. No. 3 and U. S. No. 4 developed by Harter7/ are very susceptible. Boyd was of the opinion that the rust form with which he worked was form No. 2 of the rust pathogen. As shown in Table 1, the Virginia hybrids were very resistant or immune to the Hawaiian form of rust, while U. S. No. 3 and U. S. No. 4 were both susceptible, although not severely so. Of the two latter varieties, U. S. No. 4 showed slightly more yellowing around the sori than U. S. No. 3.

Specimens of rusted leaves were sent by clipper plane to Dr. L. L. Harter of Beltsville, Maryland, in March 1938. Viable spores were obtained

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5/Townsend, G. R. Reactions of varieties of snap beans to rust. Plant Disease Reporter 22: 2-4. 1938.

6/Boyd, O. C. Rust resistance in pole beans. The Extension Pathologist 30: 54-55. 1937.

7/Harter, L. L. Two new rust-resistant, white-seeded Kentucky Wonder beans. Seed World, Jan. 1936.

Table 1. Reactions of bean varieties to rust in Hawaii.

Variety of Bean	Source	Reaction a/ 0	1	2	3	4	5
Kentucky Wonder Brown	Aggeler and Musser						X
Kentucky Wonder Brown Rust Resistant	"					X	
Kentucky Wonder White #37	"					X	
Kentucky Wonder White Rust Resistant (regular)	"						X
Kentucky Wonder White Rust Resistant Special	"				X		
Early White-Seeded Kentucky Wonder	Ferry Morse						X
Rust Resistant Kentucky Wonder	"		X				
Rust Resistant Morse's 191	"			X			
Morse's #191	"					X	
Kentucky Wonder #192	"		X				
Idaho Refugee	Associated Seed Growers					X	
Wisconsin Refugee	"				X		
Lazy Wife	"			X			
McCaslan Pole	"					X	
Kentucky Wonder Brown Seeded	"						X
Kentucky Wonder Brown Seeded Rust Resistant	"		X				
White Kentucky Wonder	"					X	
Tendergreen	"		X				
14-A-2-R-22	S. A. Wingard		X				
17-A-6-R-18	"			X			
17-B-8-33-R-3	"			X			
17-B-32-R-3	"		X				
32-B-1-2	"		X				
32-B-32-34	"		X				
32-B-32-34-R-7	"		X				
32-B-32-34-R-25	"		X				
32-C-3-R-1-1936	"			X			
32-C-3-R-4-R-1-1936	"		X				
32-C-4-J-R-5	"			X			
32-C-4-J-R-20	"		X				
32-C-4-X-20	"			X			
32-C-4-X-R-20	"		X				
32-C-4Z	"		X				
32-C-4-1-34-R-8	"			X			
32-C-6	"		X				
34-B-4-33-R-8	"		X				
34-B-32-1	"		X				
34-B-32-34-R-6	"		X				

a/ 0 = None; 1 = Flecks; 2 = Trace; 3 = Slight; 4 = Moderate; 5 = Severe.

Table 1. (Continued).

Variety of Bean	Source	Reaction 0	1	2	3	4	5
Lanin	New Hampshire Agricultural Experiment Station						x
U. S. No. 3 (1937 crop)	United States Department of Agriculture					x	
U. S. No. 4	"					x	
Lima bean (variety unknown)	Waipahu, Oahu, T. H.	x					
Lualualei	Koko Head, Oahu, T. H.						x
"	Waianae, Oahu, T. H.						x
"	Hoaeae, Oahu, T. H.						x
"	Kahuku, Oahu, T. H.						x
"	Kahuku, Oahu, T. H.						x
"	Kaaawa, Oahu, T. H.						x
"	Maunawili, Oahu, T. H.						x

and this investigator reports[8] "the reaction you received was almost identical with the results I obtained here by inoculating U. S. No. 3 and U. S. No. 4 with the rust you sent."

Townsend[9] reports that Tendergreen (A. S. G.) was very susceptible to the physiologic form of rust present in Florida in 1936 and 1937. This variety, planted side by side with susceptible Lualualei in Hawaii, showed no reaction to U. phaseoli typica. Harter[10] gives the variety Lazy Wife a reaction rating of 1 (highly resistant) to rust, physiological form No. 1, under greenhouse conditions, and a rating of 0 (immune) under field conditions. In Hawaii, this variety shows approximately similar reactions (Table 1). Fifteen varieties of lima beans were tested by Harter, nine of which rated "highly susceptible", and the remainder showed "considerable resistance". The variety (unnamed) of lima bean grown in Hawaii is immune to the local form of rust, to such an extent that many growers have replaced Lualualei with limas.

The Hawaiian form of rust is considered to be distinct from forms No. 1 and No. 2, a conclusion based on the inconsistencies found between the reported reactions of various bean varieties to forms No. 1 and No. 2 and the reactions of these varieties to the Hawaiian form.

8/Personal communication to the writer, July 15, 1938.
9/Townsend, G. R. loc. cit. See footnote 3.
10/Harter, L. L., C. F. Andrus, and W. J. Zaumeyer. Studies on bean rust caused by Uromyces phaseoli typica. Jour. Agr. Res. 50: 737-759. 1935.

All of the varieties listed in Table 1 have received one yield trial in the field, with forty to fifty plants per variety. Field records of the incidence of rust on these varieties have checked very closely with data obtained in the greenhouse. Some varieties are very promising yielders but suffer considerably from anthracnose (Colletotrichum lindemuthianum) and a species of Phoma very common on beans in Hawaii, while a few show resistance to both of these organisms as well as to rust. Future work will decide if one or more of these outstanding varieties are acceptable to Hawaiian growers; if not, it may be necessary to cross Lualualei with the most promising introduction.

(Hawaii Agricultural Experiment Station, August 10, 1938).

BOTRYTIS INFECTION OF ONION LEAVES AND SEED STALKS

C. E. Yarwood

A white spotting of onion leaves and seed stalks, possibly the same disease as described by Ivanoff from Texas (P. D. R. 22: 194-195, 1938) has been observed in the region of San Francisco Bay during the past three years. The disease has been most abundant on closely planted onions, and on those infected and injured by downy mildew (Peronospora destructor (Bork) Caspary), but has not appeared to be serious, though it has not been studied closely. The disease is characterized in its early stages by oval whitish or grayish lesions about 1 to 10 mm. long and elongated in the direction of the long axis of the leaf. The lesions bear some resemblance to lesions caused by thrips injury but lack the cuticle injury and surface excrement characteristic of thrips injury. No sporulation on the localized lesions on living leaves has been observed and free-hand sections of typical lesions did not reveal the presence of a fungus. However, on dead leaves of infected plants sporulation of Botrytis was observed and the sporulating fungus was isolated and identified by Dr. H. N. Hansen as Botrytis cinerea Pers. Inoculations of greenhouse plants with spores from infected sporulating leaves or with spores from pure cultures of Botrytis cinerea from greenhouse orchids produced in three days a white spotting of the leaves similar to that observed on field plants. With heavy artificial inoculations the grayish spots have been observed to merge and cause wilting and finally killing of the leaves, progressing from the tip downwards. From the above information this onion disease appears to be basically similar in nature to the chocolate spot disease of broad beans described by A. R. Wilson (Ann. Appl. Biol. 24: 258-288, 1937) and the spotting of tomato fruits described by Ainsworth et. al. (Ann. Appl. Biol. 25: 308-321, 1938).

Another onion disease, distinct from the above, is characterized by whitish dead lesions entirely surrounding the seed stalks, and with gray tufts of Botrytis sporophores and black sclerotia formed in a random

arrangement or in concentric arcs about 1 cm. or less apart beneath the epidermis, or occasionally breaking through it. The fungus in these tufts has been isolated and identified by Dr. Hansen as Botrytis allii M. T. Munn. Usually infection moves up from the base, presumably originating from bulb and soil infection, but infections starting in the flower head and moving down are not uncommon. This disease has been observed in experimental plots in Berkeley during the past three years, and during 1938 was apparently responsible for the killing of every seed stalk in one plot of about 300 plants. During 1938 also the same disease was abundant in seed fields near Santa Rosa, where it was more injurious than downy mildew. Counts on July 13 in four fields of different varieties showed a maximum of 23 percent of the seed stalks infected in one field and a minimum of 10 percent in another. The average of four fields (2,100 seed stalks counted) was 16 percent of the seed stalks infected with Botrytis and 9 percent infected with Peronospora. Infection with Botrytis was more serious than infection with Peronospora because seed stalks with one or two lesions caused by Peronospora may produce a fair seed crop while seed stalks infected with Botrytis generally produced very little seed.

(University of California).

BLACK POX FRUIT SPOT OF APPLES IN PENNSYLVANIA IN 1938

R. S. Kirby and A. H. Bauer

Black pox (Helminthosporium papulosum) has increased very rapidly in Pennsylvania during the past two years. In 1937 it was found in approximately 2 out of 400 orchards surveyed. This year it was recorded in 27 out of approximately 400 orchards surveyed. The disease varies greatly according to sections of the State. It was apparently most severe in areas having the heaviest summer rainfall.

In southeastern Pennsylvania it was found in 25 out of 122 orchards surveyed or an average percentage of 20.2 of the orchards. In northeastern Pennsylvania it was found in 2 out of 94 orchards surveyed or in approximately 2.1 percent of the orchards. There is no definite collection or record for central or western Pennsylvania. The percentage of infected orchards varied in accordance with the amount of spraying. In southeastern Pennsylvania 6.4 percent of the orchards sprayed according to College recommendations had the disease, while it occurred in 32.3 percent of the orchards where only part of the recommended sprays were applied and 42.8 percent of the unsprayed orchards.

There were definite indications that Bordeaux and other copper sprays applied during July and August reduced the amount of infection on both leaves and fruit over other trees of the same variety which were sprayed with sulphur sprays.

Table 1. Relative susceptibility of apple varieties to black pox fruit spot, taking into consideration only orchards in which black pox was found on fruit of one or more varieties.

Variety	Number of orchards this variety was examined in	Number of orchards this variety was infected in	Percentage of orchards variety was infected in	Average percentage of fruit infected
Rome	12	11	91.8	25.8
Smokehouse	5	5	100.	21.5
Grimes	6	6	100.	21.
Stayman	22	7	30.5	.7
Delicious	7	4	57.2	2.3
McIntosh	2	1	50.	1.
Northern Spy	1	1	100.	24.
Paragon	1	0	0	0
York	1	0	0	0
Jonathan	1	0	0	0
Crouser	1	1	100.	28.
Old Fashioned Winesap	1	0	0	0
Winter Banana	1	0	0	0
Fallawater	1	0	0	0
Ohio Non Pareil	1	0	0	0
Golden Delicious	1	1	100.	47.5
Grindstone	1	1	100.	100.

(Pennsylvania State College).

RECOVERY FROM SILVER LEAF OF MONTMORENCY CHERRIES

W. D. Mills

An outbreak of silver leaf (Stereum purpureum) appeared in a young Montmorency cherry orchard of George La Mont, Albion, New York, in 1935, reported by Hildebrand[1]. Counts made on June 9, 1935, by W. D. Mills and A. J. Nichols showed definite symptoms on 74 trees in the block of 439 trees, reported by Nichols[2]. A second count made on July 26, 1935, by E. H. Hildebrand and A. J. Nichols showed 65 trees with definite symptoms,

1/Hildebrand, E. H. Silver leaf on fruit trees in New York. Plant Disease Reporter 19: 236. 1935.

2/Nichols, A. J. Silver leaf of cherries. In Weekly News Letter 1935: 87. June 17, 1935.

reported by Hildebrand3/. Counts made by Hildebrand4/ in 1936 showed 4 percent (or 15 trees) affected. Careful examination of this plot in 1936 and 1937 by the writer did not reveal a single tree with definite symptoms.

Hildebrand4/ stated in 1936 that, "the remarkable recovery supports the idea that exposure may have played a more important role than the fungus in the cause of the trouble". Before accepting this explanation we should consider the article by Brooks and Brenchley5/ on the recovery of plum trees from silver leaf on various root stocks. They report inoculating fifteen five-year-old plum trees on common plum stock with Stereum purpureum with the result that all shoots were silvered in June 1930. Counts in August 1934 showed 12 of the 15 trees were free from silver leaf. In another longer experiment dealing with natural silver leaf infection, ten varieties of plums on nine root stocks were planted in February 1921. A total of 284 trees were attacked by silver leaf in ten years and, of these, 206 had recovered when the trees were removed in the winter of 1932-33.

In connection with the 1930-34 experiment, Brooks and Brenchley state; "The high rate of recovery on common plum stock is probably related to the hot dry summers of 1933-34". This is of particular interest since in western New York the July temperatures in 1936 exceeded the 40-year weather record for this area, and summer temperatures for the past four years have been above normal. These high temperatures appear to explain the recovery of this block of cherries from silver leaf.

(New York State College of Agriculture).

BRIEF NOTES ON STRAWBERRY DISEASES

LOW STAND OF STRAWBERRY PLANTS IN EASTERN NORTH CAROLINA, SEPTEMBER, 1938: On a trip through the strawberry region of eastern North Carolina, the percentage of stand of plants in the fields seen was estimated. The stand was so surprisingly low that it is given herewith:

17 fields observed September 14, 44 percent (range 2 to 80 percent) Pender and Duplin Counties.

18 fields observed September 13, 60 percent (range 20 to 95 percent) Columbus County.

3/Hildebrand, E. H. loc. cit. See footnote 1.

4/_____ Further observations on silver leaf of fruit trees in New York. Plant Disease Reporter 20: 275-276. 1936.

5/Brooks, F. T. and C. H. Brenchley. A note on the recovery from silver leaf disease of plum trees on common plum and myrobolan stocks respectively. Journ. Pomol. & Hort. Sci. 13: 135-139. 1935.

Other fields were probably plowed up because the loss was too great to make it profitable. Examinations were not made of each field to determine the reason, but the usual causes reported have been: (1) too acid a soil, and (2) infestation by plant lice aggravated by the short periods of hot, dry weather that occur nearly every year. (Geo. M. Darrow, E. B. Morrow, and G. A. Meckstroth. Division of Fruit and Vegetable Crops and Diseases).

NON-YELLOWING STOCKS OF BLAKEMORE STRAWBERRY: Last fall a non-yellowing stock of the Blakemore strawberry in Tennessee was reported to the writers but it was not possible to examine it then. On May 3, 1938, a large acreage of this stock on the place of R. R. McUmber, Greenfield, was inspected and no yellow plants were found. A small field propagated from this stock was examined in Maryland in October and again no yellow plants were found. Mr. A. N. Pratt, State Horticulturist of Tennessee, and Mr. R. R. McUmber report that no yellow plants have been found this season in some sixteen acres nor in any of the stock in the eight years that it has been known. As nearly 3,000,000 plants were sold last year, there is a very large supply of plants of this stock available.

Nine fields of plants of the Albany, Georgia, stock of the Blakemore reported last year (P. D. R. 21: 400-403), were examined in Maryland in October and but one yellow mother plant and its runner plants were found. This is a smaller number of yellow plants than were found in this stock last year, even though a far larger acreage was examined this season. It would seem that by another year non-yellowing stocks only should be propagated and sold. (Geo. M. Darrow and J. B. Demaree, Division of Fruit and Vegetable Crops and Diseases).

LEAF RUST ON FALL WHEAT IN OKLAHOMA

Charles C. Brown

A survey for wheat leaf rust [*Puccinia rubigo-vera tritici*] was made November 5, 1938 from Stillwater northwest to Enid, thence south to Kingfisher, and northeast to Stillwater. Fields were examined about every eight miles on the route.

The results showed 54 percent of young fields with a trace of primary infection, the pustules being very small, isolated, and in all probability not over two weeks old. Volunteer wheat was present in some of the fields examined. The volunteer plants, in most cases, exhibited primary infection, but in only two cases secondary infection was found on single plants. Volunteer wheat was found in about 60 percent of the fields examined; however, there were only a very few plants and these were not over three weeks older than the planted wheat. There was no indication of volunteer wheat which might have been in a vegetative state throughout the summer months. The

wheat fields examined were in fair condition, recovering nicely from the drought. The leaves of the young plants were about 5 to 8 inches long and the volunteer plants had leaves 12 to 18 inches long.

The presence of road-side grasses, meadows, or old straw piles seemed to have no influence on the distribution of the infection over the fields. Plants were examined growing in the roadside, by the meadows, and in the straw piles. None of these plants showed infection.

Fields examined in the vicinity of Stillwater October 29 and 30 were free of rust but recent examinations show primary infections present in the fields.

The distribution and prevalence of primary leaf rust pustules appears to indicate that the first general infection took place about October 25, which is in agreement with the results from airplane spore traps exposed at that time by K. Starr Chester.

(November 8, Oklahoma Agricultural and Mechanical College).

COLEOSPORIUM VERNONIAE ON PINUS RIGIDA IN ILLINOIS

J. C. Carter

Plants of Pinus rigida Mill. were found to be seriously infected with the aecial stage of Coleosporium vernoniae Berk. & Curt. at Jonesboro, Union County, Illinois, on May 7, 1938. The infected plants were located in and near the Thompson State Tree Nursery. The determination of the rust was made by Dr. George B. Cummins, Purdue University.

Several pines had been planted around the Nursery water tank, which was located on the top of a timber-covered hill in the State Forest Preserve only a few hundred yards north of the Nursery, and each of these trees showed serious rust infection.

There was also a large planting of Pinus rigida seedlings in nursery rows and every pine examined showed infection. The relative amount of infection on individuals ranged from very light to very heavy, but most of the plants in the nursery showed only relatively light infection.

The previously reported hosts and known occurrences of Coleosporium vernoniae in Illinois are Vernonia baldwinii Torr., V. gigantea (Nutt.) Britt., V. missurica Raf., and V. noveboracensis (L.) Willd. according to J. C. Arthur's "Rust Manual"; and V. fasciculata Michx. in Alexander, Champaign, Edgar, Hancock, Pulaski, Saline, Wayne, and Williamson counties and V. altissima Nutt. in Marion County.

(Illinois State Natural History Survey).

FROST INJURY TO WOODY PLANTS IN ILLINOIS IN MAY, 1938

J. C. Carter

Abnormally warm weather prevailed in Illinois during the four months preceding May, 1938, and in late March and April shoot and foliage growth developed rapidly on trees and shrubs. By the end of the first week of May foliage on some species, especially elm, maples, oaks, hackberry, catalpa, and sumac, had grown to approximately one-half its normal size. On May 8 temperatures dropped suddenly and continued low until May 14. Freezing temperatures and killing frosts occurred during this period. On May 12 and 13, temperatures in the northern third of the State dropped as low as 31° to 25° F. Average minima, computed from the Weather Bureau's Climatological Data for Illinois, were 29.2° for May 12 and 28.9° for May 13 in counties having freezing temperatures or lower.

Observations on the seriousness and extent of injury to plants were made in Cook, DuPage, Ford, Grundy, Iroquois, Kane, Kankakee, Kendall, Lake, Livingston, and Will counties, all located in northeastern Illinois. Many kinds of trees and shrubs showed serious foliage injury within five to ten days after the low temperature period. There was also some injury of the new shoot growth.

Some species of woody plants showed only foliage injury. This injury varied from partial to complete necrosis of the affected leaves. Other species showed partial to complete necrosis of new shoot growth as well as complete foliage necrosis.

The woody plants which showed injury and the relative degrees of injury are as follows:

A. Partial to complete necrosis of foliage occurred on each of the following fifteen woody plants:

Acer negundo L.	*Q. velutina* Lam.
A. platanoides L.	*Rhus cotinus* L.
Gymnocladus dioicus (L.)Koch.	*R. glabra* L.
Populus spp.	*Robinia pseudo-acacia* L.
Prunus serotina Ehrh.	*Sambucus canadensis* L.
Quercus alba L.	*Tsuga canadensis* Carr.
Q. borealis var. *maxima* Ashe	*Ulmus americana* L.
Q. palustris Muench.	

B. Complete necrosis of foliage and partial to complete necrosis of present season's shoot growth occurred on the following twenty woody plants:

Abies balsamea (L.) Mill.	Juglans nigra L.
A. concolor Lindl. & Gord.	Maclura pomifera (Raf.) Schneider
Ailanthus glandulosa Desf.	Magnolia acuminata L.
Aesculus hippocastanum L.	Morus rubra L.
Catalpa speciosa Warder	Picea abies Karst.
Celtis occidentalis L.	P. glauca Voss
Crataegus spp.	Platanus occidentalis L.
Deutzia spp.	Taxus spp.
Fraxinus americana L.	Vitis labrusca L.
Hydrangea spp.	Weigela spp.

C. The nine woody plants which were injured most severely were:

Abies balsamea (L.) Mill.	Maclura pomifera (Raf.) Schneider
A. concolor Lindl. & Gord.	Morus rubra L.
Catalpa speciosa Warder	Taxus spp.
Hydrangea spp.	Vitis labrusca L.
Juglans nigra L.	

It was very conspicuous that wild parsnips, Pastinaca sativa L., were seriously damaged by the freezing period. In every place where they and trees were observed growing in local areas, the wild parsnips were killed to the ground.

(Illinois State Natural History Survey).

DISTRIBUTION OF POPCORN DISEASE OF MULBERRY

A. E. Jenkins and E. A. Siegler

In 1923 the geographic range of popcorn disease of mulberry (Morus alba L.) fruits, caused by Sclerotinia carunculoides Siegler and Jenkins (4), was given as Georgia, Alabama, Mississippi, Texas, and South Carolina (5). The records for the first three States were based on Orton's report of the disease in 1903 (2), and that for Texas on the report of 1921 by Taubenhaus (6). From South Carolina the early records are all from Florence County, where the disease first came to the writers' attention in 1920 and 1921 (5, 8, Suppl. 20 and 28).

Each year since 1923, there have been more or less notable occurrences of the disease in the Southern States. This is shown by herbarium specimens and other available records, including those of the Plant Disease Survey. For convenience of reference many of these records are given here as follows:

ALABAMA:
°1/ Eclectic, Elmore County, 1925, W. L. Blain (1; 8, Suppl. 47).

FLORIDA:
° Old Spring Hill, Marengo County, 1925, W. L. Blain (1, 8, Suppl. 47).
*2/Ancilla, Jefferson County, May 12, 1926, Comm. E. West (7, 1926 and 8, Suppl. 52).

GEORGIA:
* Fitzgerald, Ben Hill County, June 4, 1924, Comm. B. B. Higgins.
° Helena, Telfair County, 1924 and May 19, 1925 (8, Suppl. 47).
° Shellman, Randolph County, July 15, 1936, O. C. Boyd.
* Fort Valley, Peach County, summer 1927, Comm. J. C. Dunegan.
* Lakeland, Lanier County, July 1928, Comm. J. L. Bridges.
° Nashville, Berrien County, previous to 1931, O. C. Boyd (7, 1931, p. 101).
° Louisville, Jefferson County, June 22, 1931, O. C. Boyd.

LOUISIANA:
Ruston, Lincoln Parish, July 19, 1926, Coll. Mr. Parrish3/.
Shreveport, Caddo Parish, June 10, 1931, Coll. C. C. McCrory3/.
Homer, Claibourne Parish, May 1933, Brodie Pugh3/.
* Homer, Claibourne Parish, July 30, 1934, Comm. C. W. Edgerton (7, 1924).

MISSISSIPPI:
° Quitman, Clark County, June 14, 1925 (7, 1935).
° Meridian, Lauderdale County, June 14, 1925, D. C. Neal (7, 1935) and June 4, 1927, H. H. Wedgworth.
° Pachuta, Clark County, May 23, 1928, D. C. Neal, H. H. Wedgworth, and L. E. Miles.
° Enterprise, Clark County, May 13, 1929, L. E. Miles and L. M. Fenner.
° Sun, Scott County, June 24, 1932 (7, 1935).
° Leland, Washington County, July 26 (7, 1932).
° Lumberton, Lamar County, June 16, 1933, L. E. Miles (7, 1935).

NORTH CAROLINA:
° Wayne, Moore, Richmond, Lee Counties, July 1929, R. F. Poole.
° Lee, Moore, and Anson Counties, 1930, R. F. Poole (8, Suppl. 81).
°* Chadbourn, Columbia County, June 23, 1931, H. G. Harrelson (7, 1931, p. 68).
° County or counties not given, 1931, R. F. Poole.
° County or counties not given, 1933, R. F. Poole.
° Moore, Richmond, Hoke, and Lee Counties, 1936, R. F. Poole.

1/A circle (°) in this position indicates that there is a record in the Plant Disease Survey.
2/An asterisk (*) in this position indicates that there is a specimen in the Mycological Collections of the Bureau of Plant Industry.
3/Report based on records at Louisiana State University, transmitted by C. W. Edgerton and I. L. Forbes.

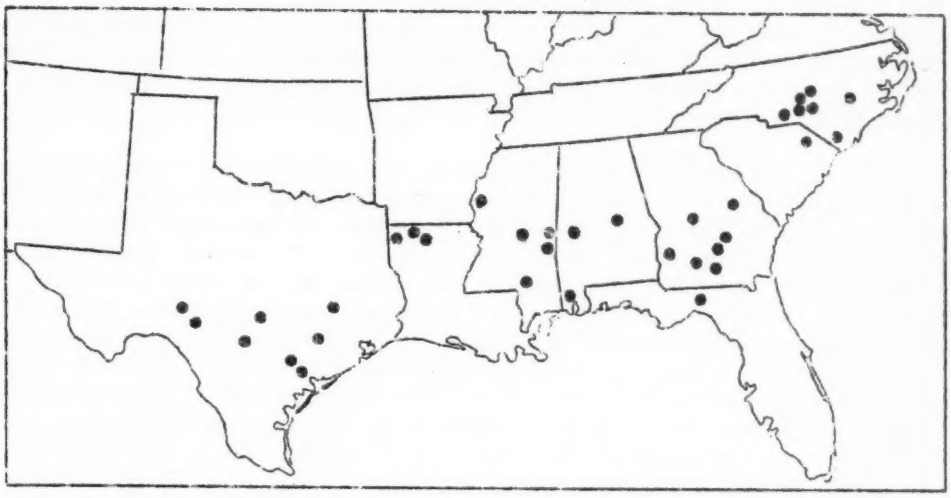

Fig. 1. Distribution of popcorn disease of mulberry in the United States up to 1938.

Dots represent counties from which the disease has been reported.

SOUTH CAROLINA:

Greenwood, Abbeville County, June 12, 1936, R. D. Steer4/.

TEXAS:

* Camp Wood, Real County, June 1924, Comm. Lee Winans.
* Victoria County, June 1926, Comm. L. Morris.
° No county named (8, Suppl. 81).
° Hays County, 1929, 1930, 1931, J. J. Taubenhaus.
° Brazos and Hays Counties, 1932, W. N. Ezekiel and J. J. Taubenhaus.
° Dewitt County, 1933, J. J. Taubenhaus.
° Dewitt and Hays Counties, 1934, J. J. Taubenhaus.
° No locality given, 1935, J. J. Taubenhaus (8, Suppl. 96).
° Colorado and Hays Counties, 1936, J. J. Taubenhaus.
° Sutton County, 1937, J. J. Taubenhaus.
* San Antonio, Bexar County, June 1938, M. Pladeck.

It will be noted that since 1923 the three additional States of Florida, Louisiana, and North Carolina have been added to the geographic range of the disease (Fig. 1). For each of the eight States represented

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4/This specimen record was communicated by Geo. M. Armstrong, who wrote (Oct. 24, 1938) that to his knowledge a few other specimens have been received during the past ten years.

the disease has been reported from one to eight counties. In some cases there are several reports from the same county, e. g., Moore County, North Carolina, and Hays County, Texas. Two early specimens now available are from Mobile County, Alabama (Delchamps, 1902, J. J. Delchamps), and Worth County, Georgia (Sylvester, 1903, W. A. Orton).

The popcorn disease of mulberry was originally reported only on white mulberry (4, 5). In subsequent reports, however, there are a few instances in which red mulberry, M. rubra L., is given as the host (7, 1931, p. 68, and 1935). The specimen represented by the 1931 report just cited is distinguishable as of white mulberry, but Miles has written that the preserved specimens on which the 1935 report is based are unsuitable for verification of the species of mulberry affected. Red mulberry is, of course, native to the United States, whereas, M. alba has been introduced and is now naturalized. Sturtevant (3) states that "in 1773 or 1774 Bartram noticed large plantations of M. alba grafted on M. rubra near Charleston, South Carolina, for the purpose of feeding silk worms, but it is probable that its first introduction was coeval with the interest in silk culture before 1660." It would be of particular interest to know definitely whether the native red mulberry is also affected.

In some localities the fruit from small groves of white mulberry trees is used for hog feed. Diseased fruit is of no value for this purpose. In order to control the disease the writers have advised intensive cultivation of the soil, especially in the areas beneath the trees, to prevent the development of apothecia. It is suggested that these cultivations should be started approximately two weeks before the mulberries are due to bloom; however, no data on the efficacy of this treatment is at hand.

Literature cited

1. Blain, W. L. A list of diseases of economic plants in Alabama. Mycologia 23: 303. 1931.
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4. Siegler, E. A. and A. E. Jenkins. A new Sclerotinia on mulberry. Science n.s. 55: 353-354. 1922.
5. _____ Sclerotinia carunculoides, the cause of a serious disease of the mulberry (Morbus alba). Jour. Agr. Res. 23: 833-836. 1923.
6. Taubenhaus, J. J. On a peculiar disease of the mulberry fruit. Nature Study Rev. 17: 282-285. 1921.
7. U. S. Bur. Plant Industry, Plant Disease Reporter 8: 129, 1924; 10: 12, 1926; 15: 68, and 101, 1931; 19: 61, 1935.
8. U. S. Bur. Plant Industry, Plant Disease Reporter Suppl. 20: 117, 1922; 28: 375, 1923; 47: 281, 1926; 52: 93, 1927; 81: 88, 1931; 96: 173, 1936.

(Division of Mycology and Disease Survey and Division of Fruit and Vegetable Crops and Diseases).

POTATO DISEASES IN MINNESOTA [1]

J. G. Leach

In a recent letter from Dr. Stakman, he suggested that I write you briefly concerning the potato disease situation in Minnesota during the past season, as a supplement to the report made by Dr. Eide. I am, therefore, submitting the following information based on my observations prior to August 10. Purple-top wilt was again prevalent throughout the State although it was apparently less destructive than it was in 1937. The stands in many fields throughout the State were poor and irregular, containing many weak plants. This condition was caused in part by the high percentage of spindling sprout that was present in the seed, and in part by the less vigorous plants resulting from tubers produced on plants affected with purple-top wilt in 1937.

Rhizoctonia was less prevalent and less injurious than in an average year. Black leg was somewhat more prevalent than it has been for the past few years but the losses were probably less than 1 percent.

Hopper burn was general but was somewhat less severe, based on observations up to August 10.

(West Virginia University, College of Agriculture, Forestry, and Home Economics).

REQUEST FOR FURTHER INFORMATION ON POTATO DISEASES

The request which was answered by the reports on potato diseases, page 412, was primarily concerned with the incidence of late blight, and the result is a very good summary of the situation with respect to that disease in most of the northeastern part of the country.

It is very desirable to have as good a statement of the importance of other potato diseases, throughout the country, and each person who is in a position to furnish such a report and who has not already done so, is asked to consider this a request directed to him personally. The result will be much appreciated by the Survey, and, we are sure, by the readers of the Reporter.

Information concerning bacterial ring rot, purple-top, blue stem, and hair sprout would be of particular interest.

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[1] See also page 422.

The following list of page references to reports of potato diseases this year in earlier numbers of Volume 22 may be helpful: 61, 123, 168, 193, 196, 197, 252, 272, 297, 299, 301, 327, 333, 345, 405. Late blight was reported on pages 61, 122, 169, 196, 274, 297, 298, 328, 342, and 406.

OCTOBER WEATHER

(From the Weekly Weather and Crop Bulletin for the week ending November 8).

The month of October was characterized by abnormal warmth and extreme dryness over large areas. Except along the south Atlantic coast, in Florida, and locally in California, the monthly mean temperatures were above normal throughout the entire country. East of the Mississippi River and west of the Rocky Mountains the plus departures from normal were moderate, but in the trans-Mississippi area the month was from 4° to 10° warmer than normal. For the past quarter of a century there has been a marked tendency for fall temperatures to range above normal and the present fall so far has been in line with this general trend.

Figure 1 shows that precipitation during the month was markedly deficient practically everywhere from the Great Plains eastward. In fact for this area, as a whole, it was one of the driest Octobers of record. Many individual stations in the South and the Great Plains reported less than 10 percent of normal rainfall, while in a number of cases the State averages were less than 20 percent. Over the eastern two-thirds of the Country only Florida, the States of the north Atlantic area, North Dakota, and Wisconsin had as much as half the normal October rainfall. On the other hand, amounts were relatively heavy in central and northern sections from the Rocky Mountains westward, including Montana, Wyoming, Idaho, Utah, Nevada, Washington, Oregon, and California. In California the high State average resulted from heavy rains in the central and northern counties; the southern counties were extremely dry. In some Western States there was great contrast in the amount of moisture received; Utah had more than one and a half times the normal and Arizona only 13 percent of normal.

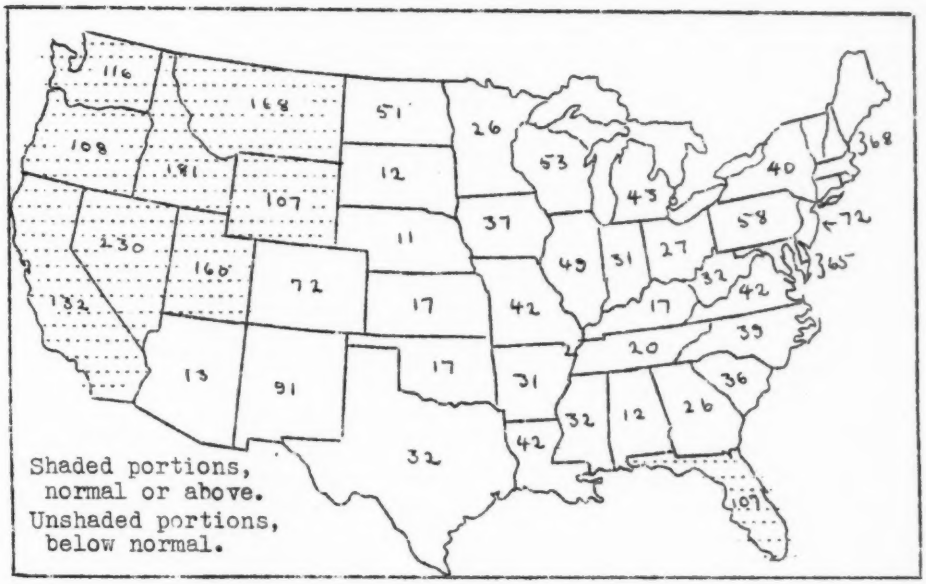

Fig. 1. Percentage of Normal Precipitation, by States, October 1938.